



Evaluation of Mobile Phone Usage in Patient Management: The Case of Igabi Health Sector, Nigeria

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Abstract

This study evaluated mobile phone usage in the health facilities in Igabi local government Nigeria. The study was guided by the following research objectives: i) to establish the usage of mobile phone applications in the health facilities in Igabi local government, Nigeria; and ii) to assess the factors hindering mobile phone application usage in the health facilities in Igabi local government, Nigeria. This study used cross-sectional survey design and a target population of 325 participants. Sample size of 179 respondents was computed using Slovine's formula. The main research instrument was questionnaires. Data was analyzed using frequency and percentage tables. The findings showed that mobile phones were mainly used in health sector of For texting messages(83%),For making calls(66.9%),For video charting(61.5%),For taking photos of different medical related output(87.2%),,Patient Monitoring(43.5%),Medical Education and Training(42.6%),Information management(30.4%),Time management (56.1%) and ,Emailing (59.5%). The results cited the following as major challenges of using mobile devices in health sector. Anxiety(42.6%),Ignorance/lack of knowledge/training (43.9%),Expensive(60.8%),Social influence (52.7%),Poor network for smartphones(54.7%),Privacy and security issues(50.7%)No common digital format for storing patient data.(45.3%),Technical challenges(47.3%). The study recommended that the health sector since the patients are not ignorant on the use of mobile devices (34.9%), the health sector should work on the technical challenge, network for smartphones and integration of different systems.

Keywords: Evaluation, Mobile phone, mobile Phone Use and Health Sector

1 Introduction

Over the past few decades, computing and communication technologies have changed dramatically. Bulky, slow computers have been replaced by portable devices that can complete increasingly complex tasks in less and less time (International Telecommunications Union (ITU, 2010). Similarly, landlines have been replaced by mobile phones and other mobile communication technologies that can connect people anytime, anywhere, transmit text messages (short message service; SMS), photographs, and data at the touch of a button. These advances have led to the development of mobile-health (mHealth)— which is conceptualized as the use of mobile computing and communication technologies in health care and public health. mHealth has applications. mhealth can be used to facilitate data collection and to encourage health-care consumers to adopt healthy lifestyles or to self-manage chronic conditions. It improve healthcare service delivery processes by targeting health-care providers or communication between these providers and their patients. Mobile technologies provide clinical management support in settings where there are no specialist clinicians, and they can

be used to send patients test results and timely reminders of appointments (Okuboyejo at al. 2012).

Mobile technologies include mobile phones; personal digital assistants (PDA) and PDA phones (e.g., BlackBerry, Palm Pilot); Smartphones (e.g., iphone); enterprise digital assistants (EDA); portable media players (i.e., MP3-players and MP4-players, e.g., ipod); handheld video-game consoles (e.g., Playstation Portable (PSP), Nintendo DS); and handheld and ultra-portable computers such as tablet PCs (e.g., ipad and Smartbooks). These devices have a range of functions from mobile cellular communication using text messages (SMS), photos and video (MMS), telephone, and World Wide Web access, to multimedia playback and software application support. Technological advances and improved computer processing power mean that single mobile devices such as smart phones and PDA phones are increasingly capable of high level performance in many or all of these functions (Vital Wave Consulting, 2009).

1.1 Problem Statement

Strengthening the health sector and establishment of up to date ICT facilities to ease communication between the health worker and patient, has been key and top priority concern for the government of Nigeria

Not only are four public health facilities within Igabi local government (Ministry of Health Annual Report, 2015), the healthcare workers too are very few to serve a population of over 3 million people. This implies that when patients receive health services and return to their home villages or wards, service providers may not be able to monitor or reach them in order to know their where progress. Additionally, it's hard to establish whether the prescribed medication yielded positive or otherwise due to difficulty in follow up and lack of communication. This prevents care providers from knowing the impact of a treatment or medication on patients (Badamasi, 2015). This study was an evaluation of mobile phone usage in the health sector of Igabi local government.

1.2 Purpose of the Study

The purpose of this study was to evaluate the usage of mobile phone applications in the health facilities of Igabi local government, Nigeria.

1.3 Objective of the Study

- i. To establish the usage of mobile phone applications in the health facilities in Igabi local government, Nigeria.
- ii. To assess the factors hindering mobile phone application usage in the health facilities in Igabi local government, Nigeria.

2.0 Review of Related Work

2.1 Usage of Mobile Phone Applications in the Health Sector

The widespread use of mobile technologies will have the potential to move healthcare from episodic to continuous care through constant innovation. According to Peskin (2010), compared to programs in the classrooms or on stationary computers, health education specialists can use mobile health behavior change interventions to be more highly-interactive. The interventions may also include real-time interactions with individuals attempting behavior changes.

Smart phone technologies can impact physician practices and improve patient care (Sarasohn-Kahn, 2010). Using mobile health monitoring, studies showed that health professionals or health education specialists can send and receive patient information in real time using smartphones for motivation, behavior modification, patient adherence, or decision support in interventions (Fukuoka, et al. 2011; Vervloet et al. 2011). Some mobile-based technologies include sensor technologies that send measurements back to health care professionals or health education specialists.

In one randomized control trial, simple short message service (SMS) text reminders showed promise for behavior modification when type 2 diabetes patients missed taking their diabetes medication (Vervloet, et. al. 2011). During a six month period, data registered by electronic medication dispensers in real time was received through the Internet by providers. The effectiveness of medication adherence was determined by refill data. Patients who received text reminders and reported real-time medication monitoring improved their diabetes medication adherence compared to the control group with no mobile health monitoring. Motivation for medication adherence is very important in diabetes management. Medication adherence may contribute in good glycemic control as a health outcome for type 2 diabetes patients (Vervloet et al. 2011).

2.2 Factors Hindering Mobile Phone Application Usage in the Health Sector

According to Elsevier (2012), although mobile health technology is advancing at a rapid rate, there are still a few roadblocks, particularly for applications involving patient-specific data. Privacy and security issues are a big concern due to fears that personal health information will land in the hands of hackers or inadvertently shared beyond the scope of the patient's preference. The desire to share patient information among health care institutions and professionals who care for that patient must be balanced with the need to keep private information private. Historically, patient information has been "siloed" with patient records held by individual providers, so the general practitioner has one set of records while the cardiologist has another. From a medical perspective, the patient is best served when all healthcare providers have access to the complete picture (Elsevier (2012). Accomplishing this, however, is difficult not only because of privacy concerns, but also because there is no commonly accepted digital format for storing patient information. Conglomerating patient records from disparate sources is a serious technical challenge. In fact, Google abandoned its plan for a health vault precisely because of these technical difficulties (Fernando, 2012).

Handler et al. (2013) pointed out that another approach for healthcare providers and institutions is to build applications that connect to multiple systems and sources of information, but unlike simple mobile health applications that rely on general information, those that rely on patient information and medical records are very expensive to develop and maintain.

Martin (2014) cited the major Barriers to Mobile App Adoption in Healthcare namely:

- 2.2.1 Cost. A survey conducted by Technology Advice revealed that 17.7 percent of non-health app users cited cost concerns as a barrier to use. A survey from HIMSS revealed that nearly 56 percent of respondents point to lack of funding and budget as a reason they aren't adopting mobile technology.

- 2.2.2 Information. Electronic Health Records (EHR's) can provide a wealth of information for mHealth apps and present the information in an easy-to-use interface for people who download the app. However, this information can be unwieldy and overwhelming if there are no guidelines as to what information will be included on a mobile app or no
- 2.2.3 Integration. Healthcare providers can have dozens of vendors for a wide range of systems, so mHealth apps must be highly accessible and easily integrated with internal systems so that data can be shared across all providers and clinicians who need it. Before implementing mHealth apps, IT must ensure the infrastructure is designed to seamlessly integrate information into the apps themselves.
- 2.2.4 Security. Keeping data secure in the healthcare industry is of the utmost importance due to the sensitive nature of patient information and regulatory consequences attached to its safekeeping. Adopting mobile apps can be a challenge if there is a perception that the information cannot be kept secure. If data is compromised, providers face steep fines from the government. Mobile apps can be kept as secure as possible, but like any other app are always at a risk of getting hacked.

3 MATERIALS AND METHODOLOGY

Leedy and Ormrod (2001) defined research design as the strategy to approach a central research problem. A research design helps a researcher to conceptualize an operational plan to undertake the various procedures and tasks required to complete the study and ensure that these procedures are adequate to obtain valid, objective and accurate answers to the research questions. A cross-sectional survey design was adopted in this study.

According to Croswell (2009), cross-sectional research design allows for collection of information at one point in time, from a selected sample of respondents. The design was considered favorable with limited time and fiscal resources for data collection. The quantitative research involved the distribution of questionnaires to the health workers and in-patients of selected medical facilities in Igabi local government to acquire information particularly of their use mobile phones for medical purposes. A total population of 325 participants from four health facilities in each of the villages in Igabi local government was selected. Employing the Sloven's formulae, a sample size of 179 respondents was determined and tabulated in table 1.

$$n = \frac{N}{1+N(\alpha)^2}$$

Where n=sample size; N=target population; α = level of significance at 0.05.

$$n = \frac{325}{1 + 325(0.05)^2}$$

$$n = 179$$

Table 1: Study population and Sample Size

Village	No of Health Facilities	Target population		Sample size	
		Health workers	In-patient	Health workers	In-patient
Mando	1	30	45	16	25
Kawo	1	25	39	14	21
AfakaMando	1	50	47	27	28
Iddi Musa	1	45	44	24	24
Total	4	150	175	81	98
Overall population	4	325		179	

3.1 Sample Procedure

The researcher used purposive sampling technique to select only health center IVs from each of the villages. This is because each village has only one health center IV. On the other hand, both health workers and in patients were selected using simple random sampling technique since there was need to make sure every participant had an equal and fair chance of being included in the study.

3.2 Data Collection Methods

The study used survey method using self-administered questionnaire as the main research instrument. Mugenda and Mugenda, (2003) observed that questionnaires are easier to administer, with less cost and ensured greater depth of response. Basing on a 5-likert scale questionnaire (5=strongly agree, 4=agree, 3=not sure, 2=disagree, and 1=strongly disagree), closed ended questions were structured to establish student ICT skills level for their effective utilization of e-resources.

4 RESULTS

The researcher distributed 179 questionnaires but was able to retrieve 148 correctly filled and answered questionnaires giving a response rate of 83%. According to Amin (2005), if a response rate is more that 70%, it is appropriate enough to use the data for final analysis. This study therefore used 148 respondents in its final analysis. Table 2 gives the details of the questionnaires distributed and returned.

**Table 2: Usage of Mobile Phone Applications in the Health Sector of Igabi Local Government
N=148**

Usage of mobile phones in the health sector	SD	D	N	A	SA
For texting messages	11 (7.4%)	6 (4.1%)	8 (5.4%)	0 (%)	123 (83.1%)
For making calls	17 (11.5%)	14 (9.5%)	8 (5.4%)	10 (6.8%)	99 (66.9%)
For video charting	0 (0%)	26 (17.6%)	14 (9.5%)	17 (11.5%)	91 (61.5%)
For taking photos of different medical related output.	0 (0%)	0 (0%)	7 (4.7%)	12 (8.1%)	129 (87.2%)
Patient Monitoring	0 (0%)	80 (54.1%)	14 (9.5%)	3 (2%)	51 (34.5%)
Medical Education and Training	1 (0.7%)	75 (50.7%)	6 (4.1%)	3 (2%)	63 (42.6%)
Information management	0 (0%)	71 (48%)	19 (12.8%)	13 (8.8%)	45 (30.4%)
Time management	47 (31.8%)	0 (0%)	8 (5.4%)	10 (6.8%)	83 (56.1%)
Emailing	48 (32.4%)	0 (0%)	4 (2.7%)	8 (5.4%)	88 (59.5%)

Table 2, revealed that majority, 83.1% of the respondents strongly agreed that they use mobile phone applications for texting messages, while 66.9% strongly agreed that they use it for making calls and 61.5% strongly agreed that they use it for video conferencing. Furthermore, 87.2% of the respondents strongly agreed that they use their mobile phones for taking photos of different medical related output while (56.1%) strongly agreed that they use their mobile phone applications for time management and (59.5%) emailing.

Unfortunately, 54.1% of the respondents disagreed that they use mobile phone applications for patient monitoring. Similarly, 50.7% disagreed that they use mobile phone applications for medical training and education while 48% disagreed that they use their mobile phone applications for information management.

The Factors Hindering Mobile Phone Application Usage in the Health Facilities in Igabi Local Government, Nigeria

The second objective of this study was to assess the factors hindering mobile phone application usage in the health facilities in Igabi local government, Nigeria and the result is tabulated in Table 3..

Table 3: Table 2Factors Hindering the Usage of Mobile Phone Applications

Factors hindering the usage of mobile phone applications	SD	D	N	A	SA
Anxiety	57 (38.5%)	0 (0%)	25 (16.9%)	3 (%)	63 (42.6%)
Ignorance/lack of knowledge/training	73 (49.3%)	0 (0%)	4 (2.7%)	5 (3.4%)	65 (43.9%)
Expensive	44 (29.7%)	0 (0%)	13 (8.8%)	1 (0.7%)	90 (60.8%)
Social influence	53 (35.8%)	0 (0%)	8 (5.4%)	9 (6.9%)	78 (52.7%)
Poor network for smartphones	33 (22.3%)	0 (0%)	26 (17.6%)	8 (5.4%)	81 (54.7%)
Privacy and security issues	60 (40.5%)	0 (0%)	7 (4.7%)	6 (4.1%)	75 (50.7%)
No common digital format for storing patient data.	65 (43.9%)	0 (0%)	8 (5.4%)	8 (5.4%)	67 (45.3%)
Technical challenges	68 (45.9%)	0 (0%)	4 (2.7%)	6 (4.1%)	70 (47.3%)

Table 3, revealed that majority, 60.8% of the respondents strongly agreed that what hinders them from using mobile phone application for medical purposes is its expensiveness, while (54.7%) said poor network for smart phones, (52.7%) said social influence, (50.7%) said privacy and security, (47.3%) said technical challenges, (45.3%) said no common digital format for storing patient data and lastly (42.6%) said anxiety. However, (49.3%) of the respondents strongly disagreed that ignorance or lack of knowledge or training is a hindering factor.

The findings imply that so many factors still hinder mobile phone application usage. This is attributed to very few mobile phone application usage in Igabi health sector.

5 DISCUSSION:

The results on the use of mobile devices were in agreement with the findings of Vervlo et.al. (2011) that they were used for simple short message service (SMS) text reminders and making calls for reminding during medication.

The results were also in agreement with the Elsevier (2012) findings that security was one of the limitations of using mobile devices in health sector. Further more Handler et al. (2013) and Martin (2014) findings of integration whereby before implementing mHealth apps, IT must ensure the infrastructure is designed to seamlessly integrate information into the apps themselves .This was one of the technical challenges faced by the respondents from the findings.

6 CONCLUSIONS

In objective one, the study revealed that mobile phone applications were used for texting messages, making calls, video conferencing, taking photos of different medical related output, time management and emailing but not patient monitoring, or medical training and education.

In objective two, the study revealed that the most prevalent hindrances to mobile phone application usage included: expensiveness, poor network for smart phones, social influence, privacy and security, technical challenges, no common digital format for storing patient data and anxiety.

The general conclusion is that medical mobile phone devices and apps are already invaluable tools for healthcare professionals, and as their features and uses expand, they are expected to become even more widely incorporated into nearly every aspect of clinical practice. However, some HCPs, health facilities' management and governments remain reluctant to adopt their use in clinical practice. Although medical devices and apps inarguably provide the HCP with many advantages, they are currently being used without a thorough understanding of their associated risks and benefits. Rigorous evaluation, validation, and the development of best-practice standards for medical apps are greatly needed to ensure a fundamental level of quality and safety when these tools are used. With the implementation of such measures, the main determinant of an app's value may ultimately be its ability to provide meaningful, accurate, and timely information and guidance to the end user in order to serve the vital purpose of improving patient outcomes.

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8 REFERENCES

Aungst, T.D. (2013). Medical applications for pharmacists using mobile devices. *AnnPharmacother*; 47(7-8):1088-1095.

Bopp, J.M., Miklowitz, D.J., and Goodwin, G.M. (2010). The longitudinal course of bipolar disorder as revealed through weekly text messaging: a feasibility study. *Bipolar Disorders*. 12:327-334.

Chang, A.Y., Ghose, S., and Littman-Quinn, R. (2012). Use of mobile learning by resident physicians in Botswana. *Telemed J E Health*. 2012;18(1):11-15.

Chase, J. (2013). iPads and other drugs. *Medical Marketing and Media: The Interactive Guide*. 3:10-11.

Deloitte Center for Health Solutions (2013). Survey of US Physicians. Physician adoption of health information technology: implications for medical practice leaders. *Deloitte Development*: 1-12.

Divali, P., Camosso-Stefinovic, J., and Baker, R. (2013). Use of personal digital assistants in clinical decision making by health care professionals: a systematic review. *Health Informatics J*; 19(1):16-28.

Dolan, B. (2014). Apple helps MDs cut through medical app clutter. *Mobihealth News*. Available at: <http://mobihealthnews.com/13254/apple-helps-mds-cut-thru-medical-apps-clutter>.

Donner, J. (2008). Research Approaches to Mobile Use in the Developing World: A Review of the Literature. *Information Society*, 24: 140-159.

Elsevier, C. (2012). Mobile Applications and the Future of Healthcare. White Paper: Mobile Applications and the Future of Healthcare.

Eric Martin (2014). 6 Barriers to Mobile App Adoption in Healthcare. <https://blog.catavolt.com/2014/10/6-barriers-healthcare-app-adoption/> Retrieved on 25th February 2018.

Fernando, M. (2012). The Demise of Google Health And The Future Of Personal Health Records, *Int. J. Healthcare Technology and Management, Vol. 13, Nos. 5/6, 2012*,

Fukuoka, Y., Komatsu, J., and Suarez, L. (2011). The mPED randomized controlled clinical trial: applying mobile persuasive technologies to increase physical activity in sedentary women protocol. *BMS Public Health*; 11(1):933.

Gilly, M. and Zeithmal, V. (2011). The Elderly Consumer and Adoption of Technologies, *Journal of Consumer Research*, 12: pp. 353-357

Gough, N., Sarin, A., and Atun, R. A. (2013). The role of mobile phones in increasing accessibility and efficiency in healthcare. *Vodafone Group Plc*.

Handler, S., Boyce, R., Ligons, F.M. and Subashan, P. (2013). Use and Perceived Benefits of Mobile Devices by Physicians in Preventing Adverse Drug Events in the Nursing Home, *Journal of the American Medical Directors Association*, 14:906-910

Vervlo, et.al. (2011), Improving medication adherence in diabetes type 2 patients through Real Time Medication Monitoring : a Randomised Controlled Trial to evaluate the effect of monitoring patients' medication use combined with short message service (SMS) reminders, *BMC Health Serv Res. 2011; 11: 5. Published online 2011 Jan 10. doi: 10.1186/1472-6963-11-5*